1 Introduction

Data

The global terrorism dataset was originally from the Global Terrorism Database website (GTD | Global Terrorism Database, 2017). However, the version I decided to use is procured from the Kaggle website from the link provided here: https://www.kaggle.com/datasets/START-UMD/gtd
The dataset contains roughly 180,000 separate entries, each entry representing a unique terrorist incident from anywhere around the globe between the period of 1970-2017. The dataset originally had 135 variables and to make sure the size of this file doesn't hinder the performance of tableau. Hence, I pruned the dataset to 8 variables. Each row or entry presents a series of factors which entails the intricate details for the particular incident. Below I will present a data dictionary that will describe each variable that is relevant to the solutions of the questions queried regarding this dataset.

Name	Description	Domain
attacktype1_txt	Method of attack	Nominal
nkill	Total number of confirmed fatalities	Integer
nwound	Total number of confirmed wounded	Integer
region_txt	Region in which the incident took place	Nominal
country_txt	Country in which the incident took place	Nominal
city	City in which the incident took place	Nominal

Persona and questions

The persona is an intelligence operative who works for a global counter-terrorism unit and is studying the different terrorist incidents all over the globe to gather key insights that will better prepare governments from possible future incidents. The operative's goals are to inspect the effectiveness of different methods of terrorism and how they vary across the globe and particularly which locations suffer the most with extremism. The following questions were asked:

Q1. Which methods of attack caused the most fatalities and how does this vary by region and how does this vary between the cities of New York and London?

Q2. Which regions have the highest percentages of wounded casualties and which countries within those regions have the highest number of wounded?

1 Introduction

Requirements

R1: To answer Q1, we need to create a visualisation for the deviation between the different methods of attack against the number of fatalities. An example of a view could be a bar chart with the number of fatalities on the x-axis and deviation of attack methods on the y-axis.

R2: For Q1, two simple drop-down menu filters could be used to select different regions and cities on the bar chart.

R3: To answer Q2, we need to create a visualisation for the deviation between the different regions against the number of wounded. An example of a view could be a treemap plot segregated by region and each separate area showing the percentage of wounded casualties.

R4: For Q2, a drop-down menu filter could be applied allowing us to filter between the different countries within these regions on the treemap and going further, labels for these countries could be added to the treemap. First, we could narrow it down to the regions with the most wounded so that the selection and ranking of countries within these regions can be easily interpreted.

R5: For Q2, in tandem with using a drop-down menu filter for the treemap a separate global symbol map could also be produced to show the deviation between the different countries against the number of wounded and then the brushing and linking technique could be used in conjunction with the treemap to filter both the percentage and number wounded for countries within these regions.

2 Design

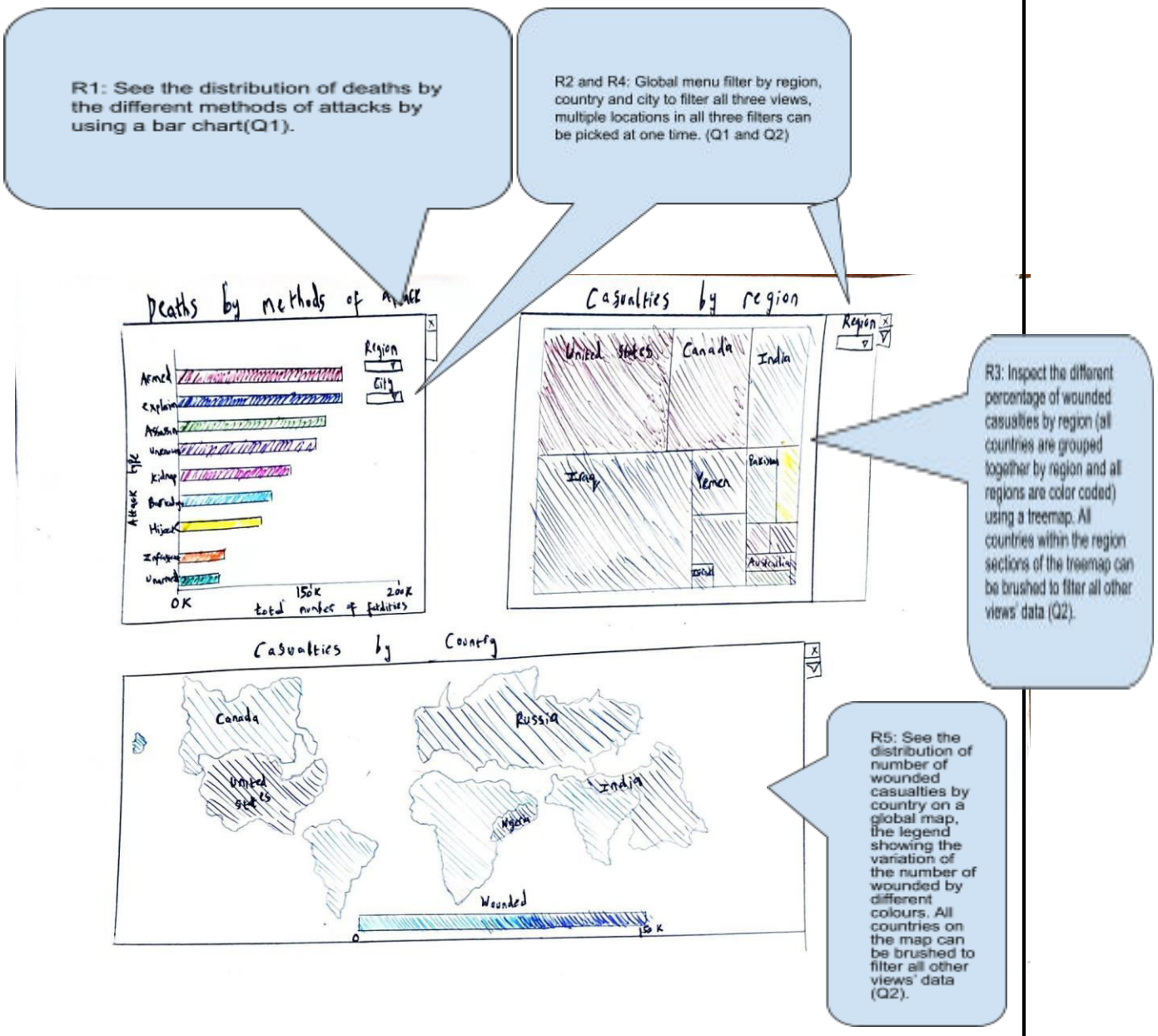
Paper Landscape

Terrorist activity across the globe

Goal: How do methods of perpetrated attacks and geographic location factors such as region, country and city influence the severity of terrorist incidents?

Q1. Which methods of attack caused the most fatalities and how does this vary by region and how does this vary between the cities of New York and London?

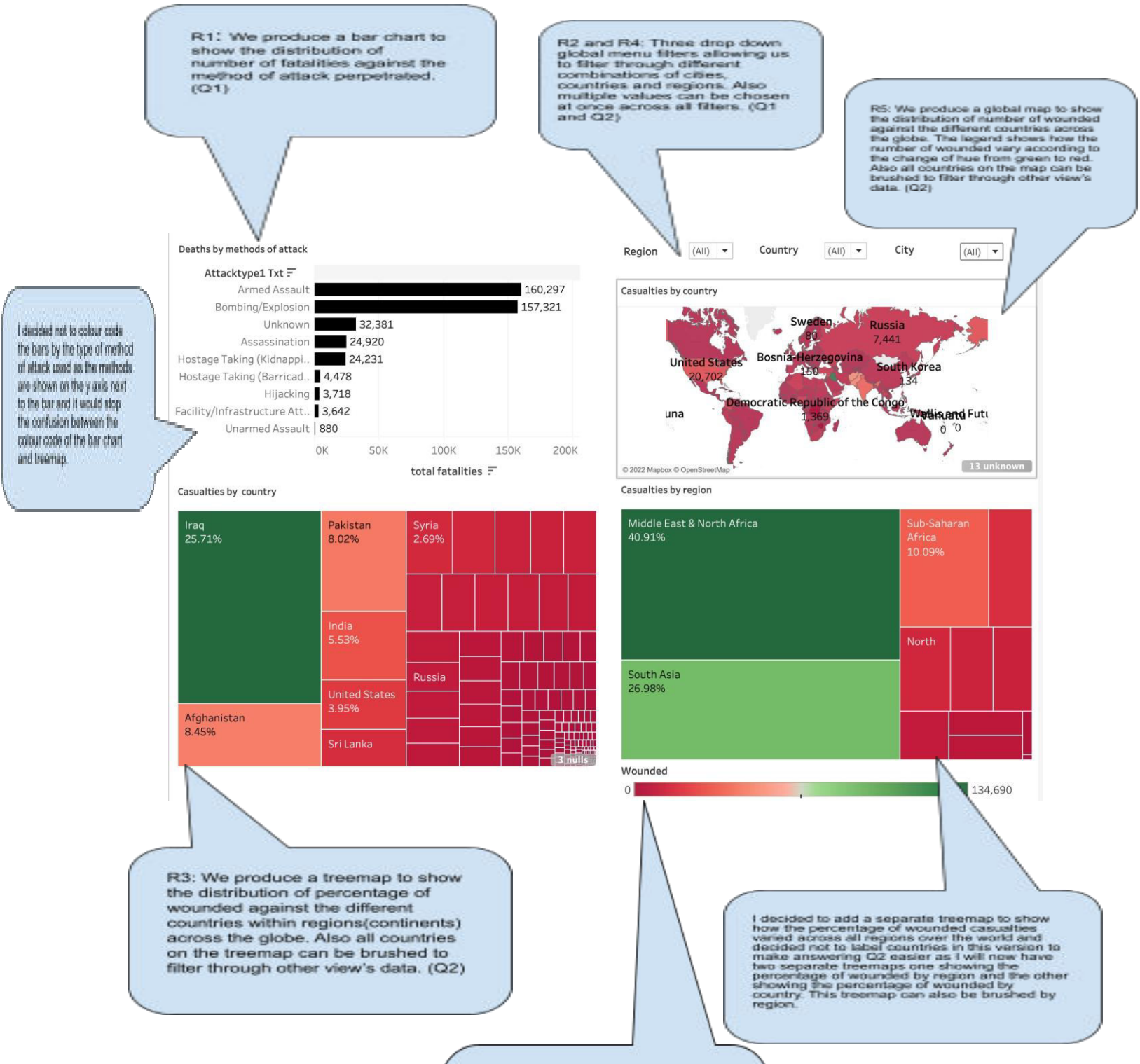
Q2. Which regions have the highest percentages of wounded casualties and which countries within those regions have the highest number of wounded?



Result: The operative can view key insights on how different variables impact the percentage and number of both fatal and non fatal casualties during terrorist incursions.

2 Design

Tableau Implementation



2 Design

Changes from prototype to final implementation

In the prototype design for the bar chart of attack type against number of fatalities I decided to colour code each bar respective to each attack type, however when designing my final implementation in tableau I realised there was no need to have a colour legend for attack type as each method of attack was named beside its respective bar on the y-axis. This change also would prevent confusion between the colour code of the treemap and the bar chart as they originally both used a wide range of colours and had very similar legends.

I also decided to relocate all three global menu filters and put them besides each above the global map to reduce the clutter which in turn made the dashboard better organised. Regarding organisation, I also decided to swap the location of the views of the global map and the original treemap. This change was due to the global map being taller and wider than I expected and the treemap being smaller, also adding to the fact that I was limited to a 1080p resolution in tableau this change was imperative. Furthermore, I opted to change the colour of the legend for the treemap from a difference in saturation of blue to a divergence of hue between the colour of red and green to make countries with higher and lower casualties more visible.

When designing the implementation in tableau, I recognised that my original treemap showing the percentage of casualties against countries which was colour coded and grouped by region was not enough to answer my second question as it only showed the percentage of casualties by each country. So, to combat this dilemma I chose to produce a second treemap to show how the percentage of wounded casualties varied across all regions without the countries being labelled. I also chose both treemaps to be coloured by percentage/number of wounded instead of what region they belonged to in conjunction with the global map to follow a divergence of hue between red and green. This change to the legend made coordination and understanding of the views more synonymous with one another.

The final changes I made from my prototype design to the final implementation was adding the percentage of wounded casualties on to all countries and regions on both treemaps, then adding the number of wounded casualties on to each relevant country on the global map and finally adding the number of people killed by each attack method alongside its relevant bar on the bar chart to help make answering the questions visually easier.

3 Implementation

Sheet 1- Bar chart

Each horizontal bar represents a number for deaths by each attack type. The bars are ranked in descending order from the highest number of deaths to lowest.
The column contains SUM(Nkill) and the row contains Attacktype1 Txt. The colour of the bar is chosen to be black from the colour shelf in the marks tab, as a colour scheme is not needed for each attack type as the name is given to the left of the bar. To show the number of deaths besides each bar click on the “show marks level” icon in the toolbar. The pills Country Txt, Region Txt and city were all placed in the filter shelf allowing for filtration in the final dashboard.

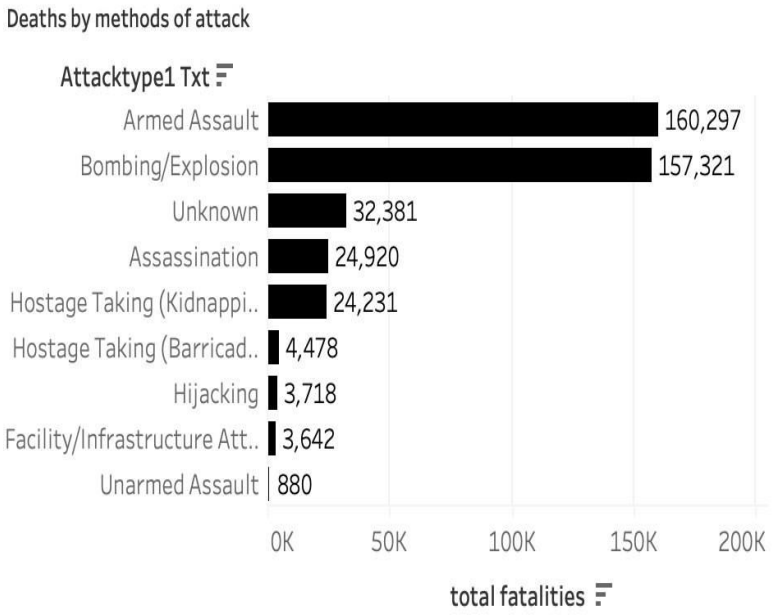


Figure 1

Sheet 2- Treemap (region)

Each portion in the treemap represents a percentage of total wounded casualties by each region across the world. The size of portions in the map are proportional to the percentage of the wounded in the region.
To begin, we place the SUM(Nwound) first in the size shelf. Next, we place SUM(Nwound) in the colour shelf then right click on the newly formed legend choosing “edit colours” and selecting the red-green diverging scheme. Then we place SUM(Nwound) in the label shelf and by right clicking the newly formed label shell, we choose the quick table calculation option and then the percent of total option. The last step is to place the Region Txt in the label and the filter shelf.

Figure 2

3 Implementation

Sheet 3- Treemap (country)

Each portion in this treemap represents a percentage of total wounded casualties by each country across the world. The size of portions in the map are proportional to the percentage of the wounded by country. The steps to create this are identical to creating the previous region treemap but instead of placing the Region Txt in the label shelf we instead use the Country Txt in its place.

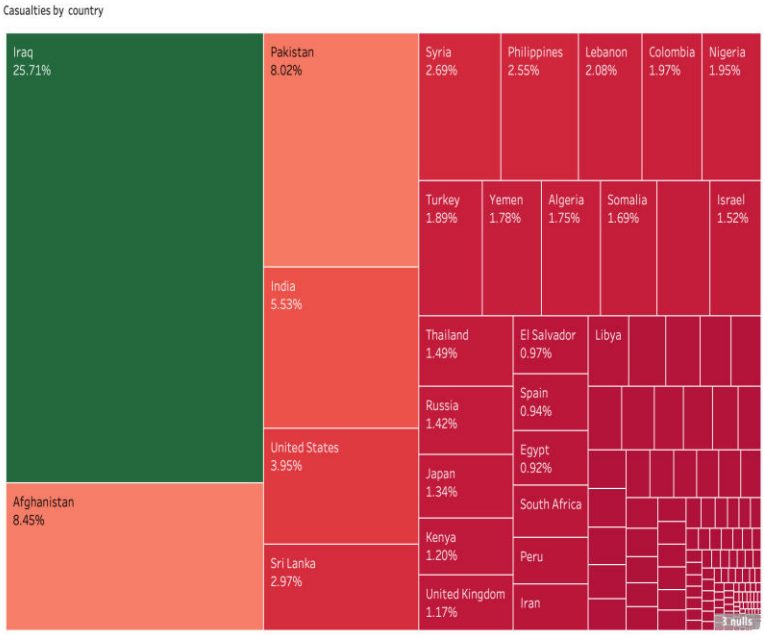


Figure 3

Sheet 4- Global map

The global map assists with viewing the raw number of wounded casualties rather than the percentages by country which is particularly useful for the second part of the second question. This view is also an easier option to use compared to sheet 3 in some cases where the country is too small to view and interact with on the treemap. The zoom in and out option that the global map has remediates this problem.

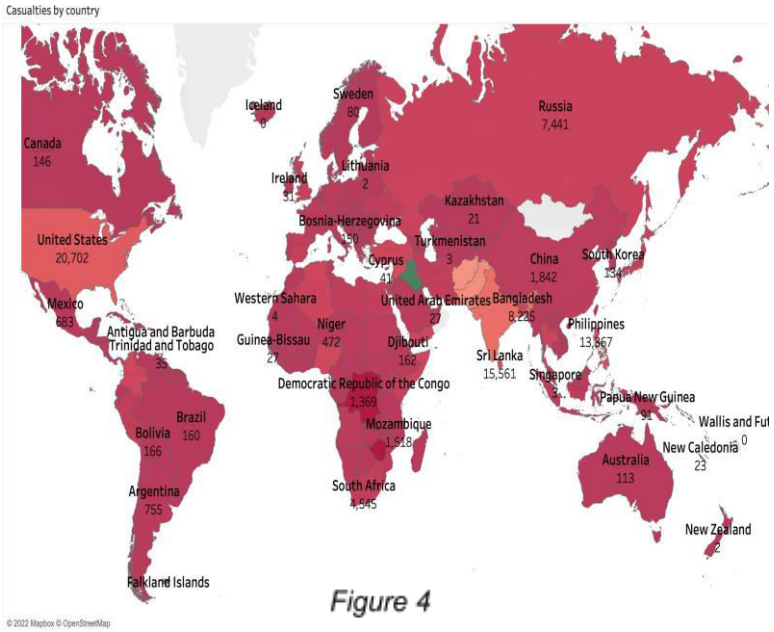


Figure 4

To create this visualisation we start by double clicking the Country Txt pill in the variable sidebar which should produce a symbol map, however this is not what we want. We desire a filled map which we select in the mark shelf by the drop menu and switch from automatic to the map option. We then place both Country Txt and SUM(Nwound) in the label shelf. Similarly, to sheet 3, we place SUM(Nwound) in the colour shelf also picking the same colour scheme as before.

3 Implementation

Dashboard

Once all views are resized to roughly the same size and placed in the order as seen on the screenshot on the right, we must delete the legends of both treemaps of the dashboard as the percentages seen on the treemaps are more relevant to answering the questions than the range of numbers seen on the legend. However, the legend for the global map is kept due to the number of wounded being key to answering the question in which the global map is going to be used. The country and region filters for each respective treemap are to be deleted as the bar chart view is composed with the three filters for the city, country and region. Next, we must right click each of the remaining filters and choose “apply to worksheets” then choose “all worksheets” to make them global. The final step is to right click each view and click the “use as filter” icon as this will make brushing available on the dashboard.

Figure 5

4 Walkthrough

Question 1 Evaluation

When answering the first part of the first question, i.e. which methods of attack caused the most fatalities and how does this vary by region/continent, the persona has the ability to use the bar chart in ***Figure 1*** to establish that the top four methods of attacks that routinely appeared across the globe and that caused the most deaths were:

1. Armed attack
2. Bombing/Explosion
3. Unknown
4. Assassination

Looking closer at the bar chart and with the use of the global menu region filter or by brushing the different regions in ***Figure 2*** on the treemap we see that armed assault consistently ranked as the deadliest attack method for regions such as the Southeast/East/Central Asia, Sub-Saharan Africa, Central America and Australasia over the period of 1970-2017. Whereas bombing was ranked just slightly behind for being the deadliest attack method for regions such as the Middle East, South Asia and Eastern Europe. For North America and Western Europe, the deadliest attack methods are hijacking and assassination respectively. The method of hijacking being ranked the highest for North America is interesting as it ranks close to the bottom for the overall global list. Further insight also shows infrastructure attacks and unarmed assault consistently rank at the bottom of this list across the majority of the regions making them the least deadly methods on the list.

When answering the second part of the first question, i.e which methods of attack caused the most fatalities in New York and how does compare to London, the persona again can use the bar chart in ***Figure 1*** and now must use the global menu filter for cities as the persona does not have a treemap or global map which could be used to brush for city locations such as London or New York.

First selecting New York city from the global menu city filter seen in ***Figure 6***, the bar chart in ***Figure 7*** shows us that almost all the deaths were related to Hijacking at a total of roughly 2,700 deaths. Judging from this number of deaths and the huge disparity between number of deaths for first ranked and second ranked methods, I believe this event to correlate with the September 11th hijackings that took place in 2001 and that killed 2,750 people in New York (Bergen, 2021).

Figure 6

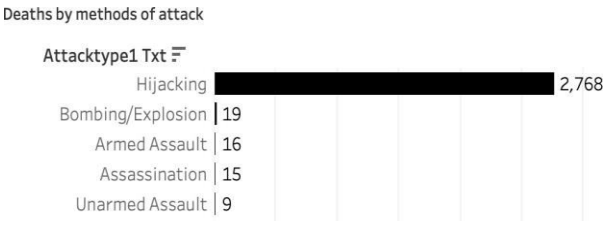


Figure 7

4 Walkthrough

Now selecting London from the global menu city filter seen in ***Figure 8***, the bar chart in ***Figure 9*** shows us a more even amount of deaths spread across the different attack methods compared to New York. The method that caused the most deaths in London was bombing/explosions at roughly 110 deaths. The only relatively recent attack on London that comes to mind involving bombs was July 7th bombing on public transport that killed 39 on the London underground and 13 on a public bus (Ray, 2021). However, this incident only accounts for about half of the deaths shown in ***Figure 9***, suggesting although New York's highest ranked attack method has taken the equivalent to roughly 20 times the amount of deaths from London's highest ranked attack method that possibly multiple bombing incidents took place in London from 1970-2017 compared to the single hijacking event in New York. Apart from these top ranked methods the numbers for other methods in both cities remain relatively low.

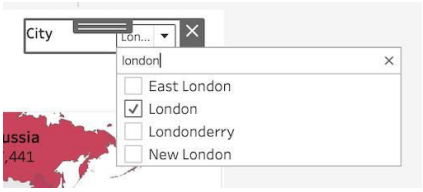


Figure 8

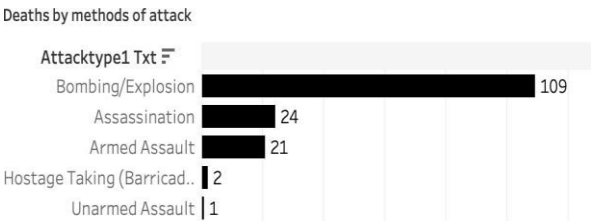


Figure 9

4 Walkthrough

Question 2 Evaluation

When answering the first part of the second question, i.e. which regions have the highest percentages of wounded casualties, the persona has the ability to hover over the treemap in ***Figure 2*** to gather that the regions that experienced the highest percentage of wounded were:

1. Middle East and North Africa: 40.91%
2. South Asia: 26.98%
3. Sub-Saharan Africa: 10.09%

Terrorism in these three regions accounted for 95% of the terrorist related casualties in 2017 suggesting that the situation seems to be getting worse. However, the number of terrorist related casualties is several times larger for countries that face civil unrest than those that are at peace (Ritchie, Hasell, Appel and Roser, 2019). This can be attributed to the conflicts that took place in locations such as Afghanistan, Iraq and Yemen have garnered anti-American sentiment which in combination with the instability in these regions has almost certainly contributed to the increase in terrorist attacks and hence the number of terrorist related casualties (Jackson, 2020).

When answering the second part of the second question, i.e. which countries within those regions have the highest number of wounded, the persona has the ability to brush the treemap in ***Figure 2*** by clicking each region individually mentioned in the list above and then proceed to the treemap in ***Figure 3*** and view the countries that have the highest percentage of wounded within the specific region and to view the raw number of casualties on the global map, the persona has the ability to brush the treemap in ***Figure 3*** by clicking each country individually shown which will highlight the selected country on the global map in ***Figure 4*** as well as display the associated number of wounded casualties underneath it.

By selecting Middle East on the treemap seen in ***Figure 2***, the treemap and global map in ***Figure 10*** and ***Figure 11*** respectively shows us that the countries in this region that experienced the highest number of wounded were:

1. Iraq: 62.85% at 134,690
2. Syria: 6.58% at 14,109
3. Lebanon: 5.09% at 10,904

Figure 10

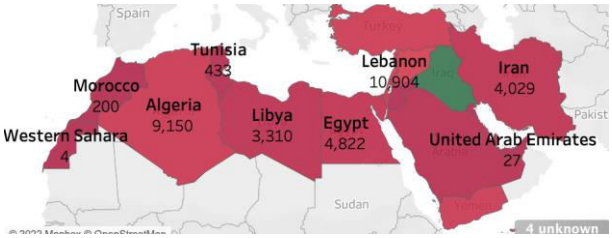


Figure 11

4 Walkthrough

By selecting South Asia on the treemap seen in ***Figure 2***, the treemap and global map in ***Figure 12*** and ***Figure 13*** respectively shows us that the countries in this region that experienced the highest number of wounded were:

1. Afghanistan: 31.32% at 44,277
2. Pakistan: 29.74% at 42,038
3. India: 20.50% at 28,980

Figure 12

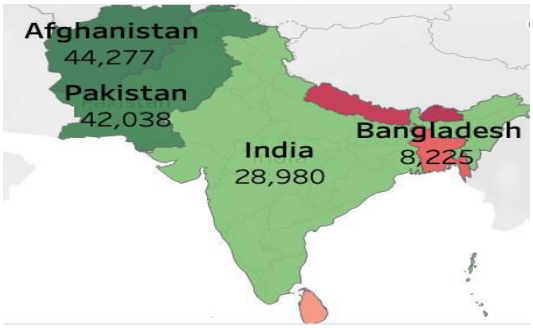


Figure 13

By selecting Sub-Saharan Africa on the treemap seen in ***Figure 2***, the treemap and global map in ***Figure 14*** and ***Figure 15*** respectively shows us that the countries in this region that experienced the highest number of wounded were:

1. Nigeria: 19.35% at 10,222
2. Somalia: 16.80% at 8,875
3. Kenya: 11.85% at 6,263

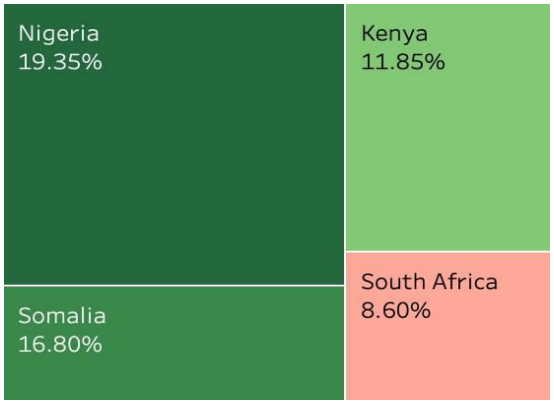


Figure 14

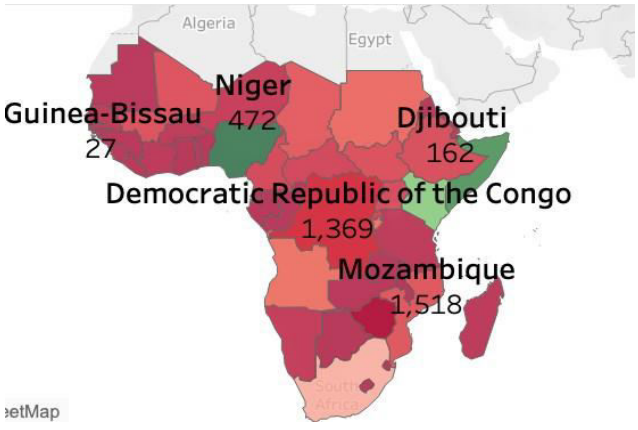


Figure 15

5 Reflective Discussion

From creating the implementations of the views on tableau to organising them and arranging them to a limited space on a dashboard, we have sufficient and relevant tools to answer both questions in detail. We are able to find the deadliest attack methods used by terrorists across different locations around the world on a region or a city-wide basis and we are able to find which countries and regions have the highest rate of wounded casualties due to terrorism related incidents using both global filters and brushing tools.

I have found that tableau has been an incredibly powerful and yet simple tool to use while working on this project to create both uncomplicated and complex visualisations. It was relevantly straightforward to create many visualisations in a short period of time as I found the layout to be very intuitive and user friendly. For the most part, I found tableau to have very few limitations. My only grievance was having to use more than a singular treemap to show the variation of the number of wounded between cities and regions. I believe learning tableau animation for singular views would fix this issue and allow us to observe the same view against a different variable and would be a skill worth acquiring for possible future projects.

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